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Sociology, Environment, and Modernity: Ecological Modernization as a Theory of Social Change

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Abstract *To minimize or at least substantially reduce damage to the natural resource sustenance-base we urgently need institutional reform within modern society. Environmental sociologists have different views as to which institutional traits can be held primarily responsible for the environmental crisis. Examples include its capitalistic or industrial character as well as the complex, highly administrated technological system of modern society. We discuss these matters in the context of the theory of "ecological modernization" as developed by the German sociologist Joseph Huber, among others. To analyze the institutional reforms required for bringing human interaction with the sustenance-base under rational ecological control, however, the theory needs to be substantially modified and complemented in several respects. However, restructuring the processes of production and consumption is only half the story. The change to ecologically sound patterns of production and consumption is limited by the dimension of the environmental crisis that has to do with nature as sustenance-base and does not provide a solution to problems related to what we call the second dimension of the environmental crisis: the changing role of nature as "intuited nature" and the way people "deal with" these aspects of the environmental crisis within everyday life. In this respect we propose that theories of modern society as a risk-society should be given greater attention within environmental sociology.*

Keywords Capitalism, concepts of nature and environment, ecological modernization, environmental movement, environmental policy, environmental sociology, industrialism, modernization and demodernization, social ecology, sustainable development.

Introduction

We are witnessing a third wave of environmental concern in the industrialized countries of Western Europe, and it could be argued that this time the environment is an issue that will not wither away. It no longer seems appropriate to think of ecology as moving up and down the agendas of politicians, concerned citizens, or sociologists. It simply took most of us more than two decades to recognize that environmental problems are not just the unintended consequences of an otherwise fortuitous trajectory of modernity. These problems appear increasingly bound up with modernity in such a fundamental and "organic" way that they cannot be dealt with in isolation from it. Their "solution" is bound

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up with altering the major cultural, political, and economic institutions of contemporary society in certain crucial respects.

This is why environmental problems have attracted the attention of a growing number of sociologists trying to understand the fundamental character of modern society. Environmental issues are no longer absent from the debate on modernity, high, late, or even postmodernity. For example, Giddens (1990, 1991) assigned the environmental crisis a rather central position in his recent work. Can sociologists now benefit from the preparatory work conducted by a small group of self-proclaimed environmental sociologists in the United States and Europe from the early 1970s onward? Is it already possible to conceive of a distinct sociological perspective on the environmental aspects of modernity? Or is the program yet to be (re)written? These questions motivated us to write this article, which is basically an evaluation of different sociological perspectives on the relationship between environment and modernity. Special attention is given to the theory of ecological modernization or eco-restructuring, which has been developed recently in European countries such as Germany and The Netherlands.

The argument is organized as follows. The first section gives a brief and selective review of the literature, arguing that environmental sociology should be freed of its predominant biological-technical outlook and use sociological theory rather than general ecology as its main frame of reference. The second section tries to develop a sociological perspective on the relation between environment and society, exploring the very concept of "the environment" and discussing some sociological theories dealing with the institutional development of modern society. Environmental sociologists should consider the kind of analytical categories required for thinking about a sustainable buildup of modern societies. Closer examination of the political discourse on sustainable development leads us, in the third part, to conclude that this can be interpreted in terms of a plea for an ecological modernization of the industrial sector of the rich industrialized world at least. The theoretical framework for this modernization process has been developed in Germany by Huber, Simonis, and Jänicke, among others. We discuss and critically evaluate Huber's ecological modernization approach as a variant of the so-called theories of industrial society in the fourth section. Fifth, we argue that recent developments in Dutch environmental policy strongly correspond with the ecological modernization approach, and we show that the debate within the environmental movement mirrors this specific modernization discourse as well. However, the ecological modernization approach is lacking, in several respects, as a sociological theory of modern society and needs remodeling and adaptation for the task of analyzing the relationship between environment and modernity. One theme that needs elaboration is the significance of "intuited nature" for our understanding of the environmental crisis; this will be dealt with in a preliminary way in the concluding section.

Environmental Sociology: A Selective Review

Figure 1 provides a brief introduction to the theoretical and empirical work already completed in the field of environmental sociology. As Buttel (1986, 1987) has shown in a number of illuminating reviews, most of the empirical work done in environmental sociology concerns themes situated on the vertical axis: Environmental attitudes and the environmental movement rank highest by far on the research agenda, followed by a growing number of studies in the field of environmental policies. Buttel's statement that most of the empirical work is normal science, in the sense of being scarcely theoretically

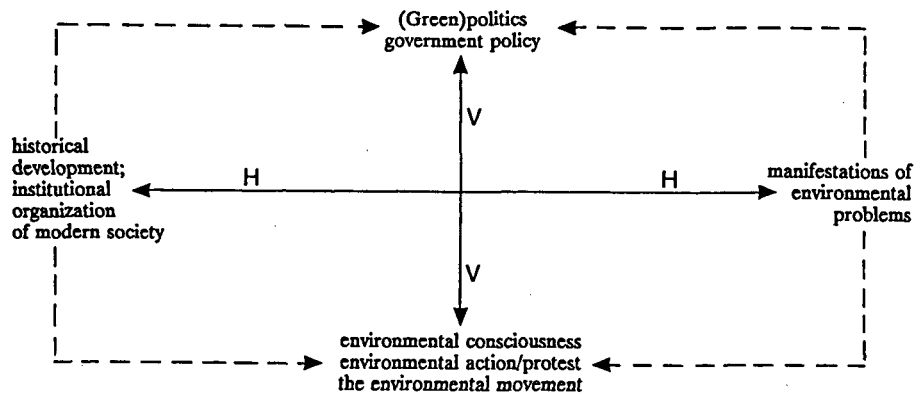


Figure 1. Theoretical and empirical themes in environmental sociology. Adapted from p. 7, N. J. M. Nelissen, 1979, *Aanzetten tot een sociologische theorie over het milieuvraagstuk*, in *Sociale Aspecten van het Milieuvraagstuk*, ed. P. Ester, pp. 5-20, Van Gorcum, Assen, The Netherlands. Used with permission.

informed, draws support from similar reviews by Lowe and Rüdig (1986) with respect to the European situation and by Ester and Leroy (1984) and Spaargaren (1987) with respect to the Dutch research tradition. This article leaves the empirical dimension aside and concentrates instead on the theoretical discussions within environmental sociology, which, in our opinion, are of central importance to the field. Theoretical efforts in environmental sociology, almost without exception, deal with conceptualizing how the institutional development of society is related to the diverse manifestations of environmental problems (see the horizontal axis of Figure 1).

Environmental sociology seems to be in disarray as far as the methodology (i.e., the conceptual identity) of the field is concerned. The whole gamut of names identifying the subdiscipline already gives an indication of this: Social ecology, ecological sociology, human or new human ecology, and environmental sociology all refer to a hybrid of sociology and ecology.

Catton and Dunlap (1978, 1979, 1980) have contributed deliberately to the coqueting with ecology. In their desire to convert their general sociology colleagues, they presented their message in the form of a simple dichotomy: either you are (still) in the "human exceptionalist paradigm" (HEP), or you choose to become a disciple of the "new ecological paradigm" (NEP). The message hardly has been picked up or understood outside the small circle of environmental social scientists. Its main effect within the subdiscipline was to keep environmental sociologists busy and divided.

Buttel (1986) has taken an informative and yet ambiguous position in the debate on the relationship between sociology and ecology. Although he insistently points out the relevance of classical social theory for environmental sociology and criticizes the HEP-NEP distinction for having been drawn in too naive a way, he nonetheless identifies the "new human ecology" as the kernel of environmental sociology and seeks to clarify the troublesome relationship between sociology and biology in terms of an "inherent duality in human existence," a duality he explains in terms of the HEP-NEP distinction. Another illustration of Buttel's ambiguous position is found in the first standard introductory textbook on environmental sociology, which he wrote with Humphrey. Differences between Marx, Weber, and Durkheim are used to elucidate various possible perspectives with regard to environmental and energy issues. In the same book, however, Malthus

and Darwin again figure as the founding fathers of the subdiscipline, with the classical human ecology of the Chicago school as its predecessor (Humphrey and Buttel, 1982). The wrestling between sociology, on the one hand, and biology and ecology, on the other, is not confined to the American branch of environmental sociology. One of the first Dutch environmental sociologists, Nico Nelissen, dedicated his Ph.D. thesis to the social ecology of the Chicago school, discussing, for example, the sociological themes of human agency, volunteerism versus determinism in the context of the analytical distinction between the biotic community and society (Nelissen, 1970).

Buttel (1986) seems to have gradually moved away from the ecologically inspired strand of environmental sociology in his sympathetic comments on the work of Allen Schnaiberg. We agree with Buttel that the growing influence of Schnaiberg, vis-à-vis those associated with Catton and Dunlap, is probably explained by two factors that distinguish his work from mainstream human ecology (Buttel, 1987). Schnaiberg (1980), notwithstanding his sympathy with the work of E. P. Odum, draws a clear analytical distinction between sociology and biology/ecology. The rules governing society, Schnaiberg argues, are basically different from those governing the ecosystems that form the sustenance base of society. We need no conceptual hybrid to consider the dangerous consequences that ecologists tell us are bound up with the enormous changes that have taken place in the sets of additions to and withdrawals from the sustenance base. Schnaiberg uses sets of additions and withdrawals to describe the interaction between society and its environment. The task of sociologists is to elucidate the developments and changes in the institutional composition of society that threaten the proper functioning of the sustenance base. A second reason that Schnaiberg's work attracts attention in the environmental field stems from his analysis of the societal dynamic behind the chronic overburdening of the sustenance base. The decisive changes that took place in the relation between modern society and its sustenance base cannot, in Schnaiberg's view, be explained by the kind of single-factor analyses (such as overpopulation or technology) that are characteristic of the environmental sciences field. Rather, these changes should be analyzed against the background of the overall structure of modern societies. Furthermore, Schnaiberg rejects Parsonian functionalism for describing the character of modern societies in favor of a theory that Buttel labeled neo-Weberian and neo-Marxist. Before we comment in more detail on his theory of the treadmill of production, we briefly sketch our own stance on the issues raised to this point.

We think environmental sociology would benefit from a further emancipation from the dominance of bioecological schemes and models, which form the socioecological kernel of the subdiscipline, in analyzing the relations between societies and their environments. Socioecological models should be left behind for two major reasons. First, as formal sociological theories, these models tend to lead to deterministic and functionalistic conceptualizations of human agency. Second, with regard to the analysis of historical developments, these models are usually prototypes of the kind of social-evolutionary schemes that are so convincingly criticized by Giddens as unfolding models of change (Giddens, 1984). Central to the critique of socioecological models in both instances is the fact that, as social systems, societies do not mechanically adapt to their environments. *Their members* choose to give priority to solving the environmental crisis by making it a central concern in the reflexive organization of society.¹ Environmental sociologists should orient themselves by recent debates within sociology, which center around the theme of actor and structure, to answer the question of whether and to what extent human behavior is determined by social and/or environmental structure.

Environment and Modernity

In this section, we sketch the contours of a sociological approach to environmental problems. The first question, of course, deals with the very definition of "environment." What shape or form does "nature" take in relation to modernity? We argue that there are two dimensions to the man-nature relationship, which need to be distinguished analytically. The second question is how the dimension of the environmental crisis that figures most prominently within the environmental literature, nature as a sustenance base, relates to the character of modern society. With what kinds of institutional traits/properties is it intrinsically connected? We deal here with the debate about whether capitalism or industrialism is the major factor behind the environmental crisis. Looking for the institutional traits that cause environmental problems also means investigating possible solutions to those problems via institutional reform. There has always been a rather significant current of thought within the environmental debate, however, that has stressed the impossibility of reducing, let alone solving, the environmental crisis given the contemporary institutional composition of modern society. Let us turn first to this preliminary question.

Nature and (Pre)modernity

The environmental movement often is said to be a demodernization movement. Central to the public image of the movement over the last 20 years has been its emphasis on premodern values, whether of a Right or Left political variety (Tellegen, 1983). Although we argue that this image of the environmental movement as one of moral protest(ers) against modernity needs to be corrected, it nonetheless contains a point of great relevance for exploring the relationship between environment and modernity. The decisive alterations in the relations between environment and society, man and nature, and so forth obviously coincide with the emergence of modern society. Several authors, both within the field of environmental social sciences and outside it, have emphasized that modern society did not gradually come into being as the mature form of an earlier, more rudimentary society. Rejecting socioevolutionary models of historical development, they instead propose a "discontinuist interpretation of modern history" (Giddens, 1985, p. 31) to accentuate the many and crucial contrasts between modern and traditional societies. This contrast is especially relevant to the man-nature relationship, as described in the following passage:

In class-divided societies, production does not greatly transform nature, even where, for example, major schemes of irrigation exist. The city is the main power-container and is clearly differentiated from the countryside but both partake of the "content" of the natural world, which human beings live both "in" and "with," in a connection of symbiosis. The advent of industrial capitalism alters all this. When connected to the pressures of generalized commodification, industrialism provides the means of radically altering the connections between social life and the material world. (Giddens, 1985, p. 146)²

The eco-anarchist Murray Bookchin also portrays alterations in the relationship between society and its natural environment in an extensive and colorful way (Bookchin, 1980). Bookchin sees the advent of modern society as first and foremost the destruction

of the cell-tissue society, and the replacement of complex, organic, harmonious ecosystems, which "yield local differences to the natural world," with simplified, inorganic systems in which the alienation of man from nature goes hand in hand with the alienation of man from man. Bookchin criticizes the "managerials" within the environmental movement for not understanding the impossibility of reconciling man and nature under conditions of generalized commodification. The only way to restore the relationship of man and nature is to "dismantle" or restructure modern society, using the Greek city-state as the example. Bookchin can be called one of the "organic intellectuals" of the environmental movement of the early 1970s. His definition of the environmental crisis is as fundamental as it is all-embracing, and the "solution" he offers points the way *out* of modern or capitalist-industrial society.

We agree with Giddens and Bookchin that a discontinuist view of history can deepen our understanding by highlighting the essential characteristics of modernity. Unlike Bookchin and many discontinuist adherents within the environmental movement, we do not think that studying premodern society implies a preference for the cell-tissue society as the basis from which to plan strategic action within the environmental movement. However, as a theoretical approach a discontinuist perspective might provide specific answers to the kinds of questions that we consider of central importance to environmental sociology.

Two Dimensions of the Environmental Crisis

The first question for consideration concerns the man-nature relationship. William Leiss, in his book *The Domination of Nature* (inspired by the work of the Frankfurter Schule), asserts that the mastery of nature within Western culture not only brought about an idea of separation between man and nature, but also resulted in a "bifurcation" of nature (Leiss, 1974, p. 135). Nature became split into *intuited nature*, the "experienced nature of everyday life," and the "abstract-universal, mathematized nature of the physical sciences" (Leiss, 1974, p. 136). Several authors, mostly from the cultural-philosophical sciences (Lemaire, 1970), recognized and worked on this duality of nature. Within environmental sociology, Schnaiberg contributed to our understanding of scientific nature, the dimension he considers to be more important than the cosmetic concern of intuited nature (Schnaiberg, 1980). Reserving a discussion of the intuited nature of everyday life for the last section of the paper, we begin by discussing scientific nature as the best documented and theorized dimension.

Scientific nature is nature harnessed to the ongoing rationalization and expansion of production. Despite the unveiling of nature in all her former mysteries by Baconian and Newtonian science, it could be said that there is still only a partial understanding of how the sustenance base functions. Ecology, the scientific discipline of the sustenance base, made us aware that nature can no longer be treated as a black box in relation to production. Nature as a black box would deliver inputs in the form of energy and raw materials and would absorb and process outputs in the form of waste. Clearly, nature can no longer be treated as a void in its functioning, whether as a stock of or a dump for material entities to be used endlessly and free of charge. This is the message that environmental economists such as Nicholas Georgescu-Roegen and Kenneth E. Boulding (and, in The Netherlands), Roefie Hueting, Johannes Opschoor, and Bob Goudzwaard understood 20 years ago when they tried to incorporate the environment as a production factor into their neoclassical economic models. Although much has already been done,

we are only just beginning to understand the difficulties of correcting this design fault of modernity (Giddens, 1990).

There appear to be two sets of relevant questions with regard to the interrelation between societies and their sustenance base. The first focuses primarily on the sustenance base; the second directs our attention to the institutional aspects of modern society that are involved. One of the basic questions in the field of environmental sciences is whether, and to what extent, we already possess or are able to develop the scientific-technical knowledge required to bring our interaction with the sustenance base under rational control. It seems to be very difficult to grasp the consequences for the environment of human action for several reasons, including (1) the complexity of the ecosystems involved; (2) the displacement of effects in time and space; and (3) the rapidly increasing scale of the man-nature interaction, which is by now truly global. The uncertainties surrounding the predictive models of the ecotechnical scientists and the sheer lacunae of knowledge that exist, for example, in the field of the ecotoxicology, make the debate about the required adjustment of social reproduction to meet the demands of ecosystem reproduction susceptible to all kinds of mystifications. In this debate political and scientific arguments are freely intermingled. The second set of questions concerns the kind of institutional reform that is required to correct the design fault of modernity in its interaction with the sustenance base. How drastic are the changes involved? In other words, which institutions need to be reformed and how central are these changes to the overall process of reproduction of modern society, both at the level of institutional development and in terms of everyday life? These questions are of basic importance to environmental sociology and will be elaborated in the next section.

Capitalism, Industrialism, and Modernity

In our view, at least three schools of thought can be distinguished when the character of modernity and its relation to the environmental crisis are considered. Each emphasizes different aspects of modernity and seeks to promote different solutions to the disturbed relation between modern society and nature as its sustenance base: the neo-Marxist approach, different versions of postindustrial society theory, and the counterproductivity thesis. We begin by commenting on the neo-Marxist position that Allen Schnaiberg has taken in this debate.

On the question of which institutional traits of modern society can be held responsible for the environmental crisis, Schnaiberg is unambiguous. The treadmill of production underlies the continuing disruption of the sustenance base. This treadmill is explained in terms of the capitalistic character of the organization of production. According to Schnaiberg, a small number of powerful corporations constantly propel the process of capital accumulation. The best way to analyze how they gain and retain their control over large sectors of production and their decisive economic and political power vis-à-vis the labor movement and the state is by using "the broad institutional perspective of structural analysts such as Marx" (Schnaiberg, 1980, p. 209). Relying heavily on the analyses of Marxist theorists such as Baran and Sweezy, Schnaiberg seems to reduce the different aspects of the environmental crisis to the monopoly-capitalist character of modern society, leaving little room for a theoretical assessment of industrialized production in relation to environmental problems. The rather straightforward Marxist analysis used by Schnaiberg has come under attack within sociology from two different perspectives, which have in common their belief that the *industrial* rather than the *capitalist* character of modern society is the more important factor in explaining the environmental

crisis. To position the ecological modernization approach (to be introduced in the fourth section) within this field of discussion, we first briefly comment on the various forms of theories of industrial and postindustrial society.

Marxist analyses have been criticized from a radical perspective by a group of authors who can be labeled "counterproductivity theorists." The ideas advanced by authors such as Barry Commoner, Ivan Illich, André Gorz, Rudolf Bahro, Otto Ullrich, and, in The Netherlands, Hans Achterhuis have resonated within the environmental movement. For example, Ullrich, in his book *Weltniveau*, criticized Marx for his preoccupation with the social relations of production, leaving undertheorized the forces of production (Ullrich, 1979). We need to incorporate into our analysis the "myth of the great machine," which is embodied in the organization of the industrial system, if we are to understand why our system of production runs counter to the goals for which it was designed and to explain the increasing discrepancy of welfare as measured by a growing gross domestic product (GDP) with the well-being of man and nature. The industrial system is highly administered in an ever more centralized, hierarchical way. This centralized, hierarchical character has to be analyzed in relation to the technical systems that are omnipresent in the system of production but are no longer adapted to demands of man and nature. Finally, this model of industrial production viewed as an organizational device has become widespread, penetrating, for example, the educational and welfare sectors of modern society. Consistent with their analyses of the environmental crisis as part of an all-embracing crisis of the industrial systems, counterproductivity theorists share the belief that a solution can only be found by at least partially dismantling the existing systems of production. Bahro (1984) expresses this very clearly by his use of the term "industrial disarmament" to summarize his program of reform.

Surprisingly, none of the authors mentioned above receives any extensive treatment in Richard Badham's overview of theories of industrial and postindustrial society (Badham, 1984, 1986). However, his main focus is that branch of sociology represented by Kerr, Bell, and Aron, among others. These were sociologists who, from the 1950s onward, developed their theories of industrial society, starting from the central assumption that "the development of industry and its impact on society are the central features of modern states" (Badham, 1984, p. 2). What unites these authors, and distinguishes them from the counterproductivity theorists, is their more benign evaluation of the "all-embracing logic of industrialism." Industrial societies pass through various phases or stages in their maturation, technology being one of the prime movers and determinants of their general development. Class conflicts belong typically to the birth period of industrial society and lose their significance during later phases of its development. In dismissing Marxist theory as irrelevant for the analysis of modern society, these theories of industrial society could also be called theories of postcapitalist society. These consensus theories were long opposed to conflict theories and vice versa within sociology. We would include, within this category, some variants of industrial society theory that are usually bracketed as theories of postindustrial society. In our opinion, the later work of Daniel Bell (1976) and the writings of Alvin Toffler, Alain Touraine, and Barry Jones share the basic tenets of the first-generation theories of industrial society. The adjective "post" stands for the transition into the newest phase in the development of industrial society, characterized by a shift toward a service-sector-based economy, the displacement of blue-collar work by white-collar work, and material growth conceptions being replaced by nonmaterial values (Inglehart, 1987). Although postindustrial society is portrayed mainly through its consequences for occupational structure, the role of science and technology, and the meaning of leisure, the changes that are supposed to take place

within the production structure would considerably lessen the burden on the sustenance base.

Frankel gives an illuminating assessment of the consistency and theoretical adequacy of both Left and Right political variants of postindustrial society perspectives. He considers how the proposed models of a "good" society deal with the relation between the different levels of social organization (local, national, and international), and with the role attributed to state versus market forces (Frankel, 1987). We think two main conclusions can be drawn from his analysis. First, a distinction should be made between demodernization and modernization variants of postindustrial society theory; second, both perspectives are, for different reasons, susceptible to criticism as regards the criteria formulated. Counterproductivity theorists, writing from a demodernization perspective, see local autonomy or even autarky as realizable by severing links with the world market and political relations. The Mondragon cooperatives serve as a contemporary example of this theoretical model. Apart from the questions that Frankel raises about their factual independence from the world market (Mondragon products are being sold on the Spanish market) and the difficulties in defining the proper scale of small-scale communities (Ulgor being a cooperative of 3500 members), we think the crucial theoretical dilemma posed by the Mondragon experiment is the way local and regional levels are thought to be related to national and inter- or supranational levels. The theoretical argument against the proposed insulae within modern society is aptly summarized in Giddens' treatment of time-space distancing:

In the modern era, the level of time-space distancing is much higher than in any previous period, and the relations between local and distant social forms and events become correspondingly "stretched." Globalization refers essentially to that stretching process, insofar as the modes of connection between different social contexts or regions become networked across the Earth's surface as a whole. Globalization can thus be defined as the intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa. (Giddens, 1990, p. 64)³

Intermediate or convivial technology, some degree of autonomy in social relationships on the personal as well as social group level, and direct responsibility for and control over materials circulating within the ecosystems are all desirable ends in themselves. But the intensification of international social relations and the increasing level of time-space distancing within modern societies make the realization of these goals in the context of local experiments, which are thought to be exempt from power relations and market forces operating on a worldwide basis, less plausible and realistic.

Local-level processes of social change are analyzed within the hyper- or super-modernization approaches as the outcome of restructuring economic production at the international level. Frankel uses Toffler's "third wave" theorem as an example of the major weaknesses inherent in a theoretical scheme in which a multinational organization-dominated network at the global level coexists with demarketized, autonomous lifestyles at the local level. According to Frankel (1987), "it seems that Toffler espouses a naive, small liberal belief in the mutual balance and coexistence of world institutions and local democracy" (p. 39). Using arguments that are sometimes empirical and sometimes theoretical, Frankel illustrates the major problems involved in the too-simple abolition of market and state regulation at regional and national levels, and those

of putting too much faith in the innovative and democratic potentials of multinational corporations. In short, his critique of industrial society theory in its superindustrial form comes down to its lack of understanding of the capitalist character of production, with state planning as a prerequisite for "taming" the treadmill.⁴

Frankel's neo-Marxist critique of industrial society theory brings us back to our starting point: the neo-Marxism of Schnaiberg. Is the opposition between Marxist analysis of capitalist society and bourgeois analysis of industrial society still the relevant dividing line within environmental sociology? Following Giddens, we think this is no longer the case. Instead, we prefer to treat industrialism and capitalism as two of the four institutional dimensions or organizational clusters of modernity that can be separated analytically (see Figure 2). Industrialism and capitalism are both highly relevant to understanding modernity and are defined by Giddens (1990) in the following way:

Capitalism is a system of commodity production, centered upon the relation between private ownership of capital and propertyless wage labour, this relation forming the main axis of a class system. Capitalist enterprise depends upon production for competitive markets, prices being signals for investors, producers, and consumers alike. The chief characteristic of *industrialism* is the use of inanimate sources of material power in the production of goods, coupled to the central role of machinery in the production process. Industrialism presupposes the regularized social organization of production in order to coordinate human activity, machines, and the inputs and outputs of raw materials and goods. (pp. 55–56)³

The different theoretical perspectives considered in this section can be summarized as focusing on the relations between different institutional dimensions of modernity. Schnaiberg's analysis of the treadmill character of production indicates those institutional alignments within modernity that can be held responsible for the chronic impetus

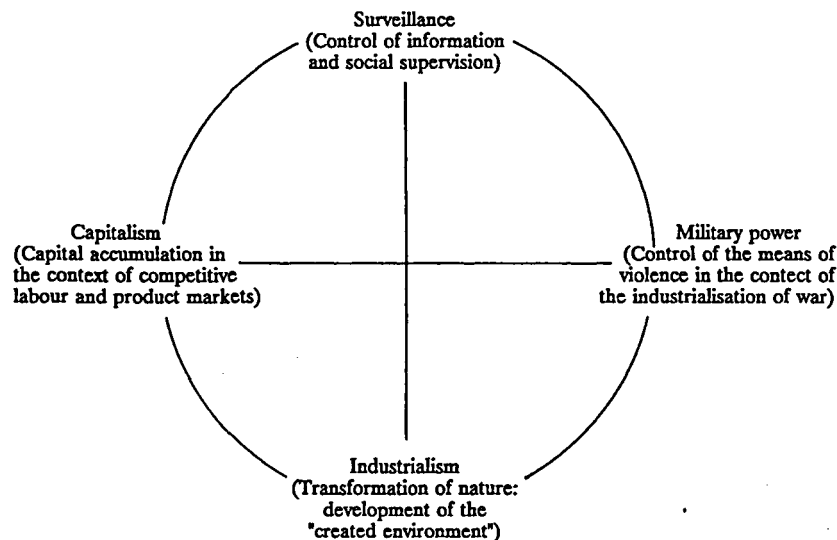


Figure 2. The institutional dimensions of modernity. (Reprinted from Giddens, 1990, © 1990 by Polity Press. Used with permission.)

toward expansion of production and transformation of economy and technology. Theorists of industrial society point out the central role of technology and machinery and man-machine relations within modern society when they describe the different stages of industrial development. Criticizing the centralized and hierarchical character of manufacturing production, Ullrich (1979) posited a specific relation between surveillance on the one hand and industrialism and capitalism on the other.

Up to this point, our discussion can be summarized in four short statements or conclusions. First, an analytical distinction should be made between two dimensions of the environmental crisis: intuited nature as experienced in everyday life, and scientific nature functioning as a sustenance base for production in modern society. The definition of the environmental crisis prevalent within the environmental sciences is the burden on or even overexploitation of the sustenance base. Second, within the field of environmental social sciences, we are in urgent need of more refined, sophisticated theories relating the burden on the sustenance base with institutional aspects of modern society. Third, contemporary sociological theories, which deal with the institutional development of modern society and which can be said to have special relevance for environmental sociology, differ with respect to:

- their general perspective on historical development, evolutionary versus "discontinuist" models of change
- their emphasis on either the capitalist or industrial character of modern society
- their evaluation of developments within the industrial sector as theorized by theories of postindustrial society.

Fourth, in exploring the relationship between environment and modernity, Giddens's analytical distinction between four institutional dimensions of modernity can be of great assistance in assessing the value and central focus of each different theoretical perspective.

The Political Discourse on Environment and Modernity

The concept of sustainable development has a central position in the contemporary political debate on environmental issues. In political terms, sustainability deals with institutional developments in modern society with relation to its sustenance base.

There seems to be a growing consensus, at least in the industrialized countries, about sustainable development as a concept for overcoming the ecological crisis. This consensus is only possible because (1) sustainable development is a rather vague concept that allows many interpretations, and (2) the concept as introduced by the Brundtland commission (World Commission on Environment and Development, 1987) integrates ecological quality with economic growth via industrialization. Economic growth and technological development, two important institutional traits of modernity, are therefore seen as compatible with and sometimes even as a condition for sustaining the sustenance base, rather than as the main cause of environmental destruction.

As Timberlake (1989), one of the contributors to the Brundtland report, observes, the concept of sustainable development is based more on opinions than on scientifically based ideas. For this reason and because of the many possible interpretations that can be placed upon it, the concept of sustainable development is only suited to our purposes to a very limited extent. Therefore, we introduce a more analytical and sociological concept consonant with the primarily political concept of sustainable development: ecological

modernization. The more analytical and sociological concept of ecological modernization highlights the relationship between the modernization process and the environment in the context of industrialized societies, whereas sustainable development also (1) pretends to be applicable to the less developed countries (Spaargaren and Mol, 1989), and (2) tries to include questions of equal development and peace. Notwithstanding these differences, both concepts originate from the same standpoint on the relationship between environment and modernity. As Simonis (1989) writes, the dominant notion in the 1990s is that the relationship between society and environment calls for "industrial restructuring for sustainable development, or 'ecological modernization'" (p. 361).

In the next section, we further elaborate on the concept of ecological modernization and situate it in the debate on environment and modernity.

Ecological Modernization: A Theoretical Framework

The concept of ecological modernization has a short history in German and, to some extent, Dutch discussions about the institutional changes necessary in Western industrialized countries for overcoming the ecological crisis. The concept is used at two levels in these debates. First, ecological modernization is used as a theoretical concept for analyzing the necessary development of central institutions in modern societies to solve the fundamental problem of the ecological crisis (see, e.g., Huber, 1982, 1991; Spaargaren and Mol, 1991). At this level, ecological modernization can be seen as an alternative to other concepts and analyses of the relationship between institutional developments in different domains of modernity and environment. Second, on a more practical level, ecological modernization is used as a political program to direct an environmental policy. As such, it includes a certain strategy with more or less concrete measures to counter environmental problems (Jänicke, 1989; Schöne, 1987; Simonis, 1989; Zimmerman, Hartje, and Ryll, 1990). The political program of ecological modernization seems to fit rather well in recent developments in environmental politics in some Western European countries.

In this section, we have elaborated on the concept of ecological modernization as a theoretical contribution to environmental sociology and have analyzed its main theoretical problems. In the next section, we analyze developments in Dutch environmental policy, as well as in the ideology and strategy of the Dutch environmental movement, in the context of ecological modernization.

Ecological Modernization as a Theory of Industrial Society

Die hässliche Industrieraupe werde sich im Zuge ihrer Metamorphosen noch als ökologischer Schmetterling entpuppen. (Huber, 1985, p. 20)⁵

[The dirty and ugly industrial caterpillar transforms into an ecological butterfly.]

This quote from *Die Regenbogengesellschaft* characterizes the central idea of ecological modernization. Ecological modernization stands for a major transformation, an ecological switch of the industrialization process into a direction that takes into account maintaining the sustenance base. Like the concept of sustainable development, ecological modernization indicates the possibility of overcoming the environmental crisis without leaving the path of modernization. Ecological modernization can be interpreted as the

ecological restructuring of processes of production and consumption. We shall use the elaborations of Huber, one of the leading exponents of ecological modernization theory, to obtain a better understanding of it. Huber (1985) uses the concept of ecological modernization as follows:

Das wirtschaftlich fast alles entscheidende Kernstück des ökosozialen Umbaus besteht in einer ökologischen Modernisierung der Produktions- und Konsumkreisläufe durch neue und intelligentere Technologien. (p. 174)⁵
 [The central economic theme of the ecosocial switchover will be the ecological modernization of production and consumption cycles by new and more intelligent technologies.]

Following Huber, we see two central projects as forming the heart of the ecological switchover: the restructuring of production processes and consumption toward ecological goals. The first project is the development, inauguration, and diffusion of new technologies that are more intelligent than the older ones and that benefit the environment. From traditional end-of-pipe technologies, there is a shift toward technologies that establish clean production processes. Microelectronics, gene technology, and new materials are seen as promising technologies for disconnecting economic development from relevant resource inputs, resource use, and emissions (Simonis, 1989), and for monitoring processes of production and consumption for their effects on the environment (Huber, 1985). This must lead to the ecologization of the economy, that is, to physical change in production and consumption processes and to the possibility of monitoring these processes. Second, the concept of ecological modernization includes economizing ecology by placing an economic value on the third force of production: nature. Nature and environmental resources should regain their place in economic processes and decision making (Immler, 1989). As Simonis (1989) questions: "Apart from labour and capital, nature is the truly quiescent and exploited third production factor. How can nature's position in the 'economic game' be strengthened?" (p. 358).

Huber's (1985) elaborations on ecological modernization make it clear that this theoretical concept belongs to the industrial society theory. In the first place, Huber analyzes ecological modernization as a historical phase of industrial society. Second, he emphasizes the logic of industrialism as central to the development of modern society. We briefly elaborate on these two issues.

Huber (1982, 1985) analyzes ecological modernization as a phase in the historical development of modern societies. He sees three phases in the development of the industrial society: (1) the industrial breakthrough; (2) the construction of industrial society, which can be subdivided into three parts corresponding with the Kondratieff cycles; and (3) the ecological switchover of the industrial system through the process of superindustrialization. This historical systematization and the position of an ecological switchover is in line with other theories of industrial society (e.g., Immler, 1989). Central to changing the phases of the industrialization process are the invention, inauguration, and diffusion of new technologies. In the first phase, the key technology was the steam engine. Chip technology is what makes the ecological switchover via superindustrialization possible in the most recent phase.

Huber (1985, 1989b) differentiates three analytical categories or spheres in analyzing modern society. Apart from the industrial system (or technosphere) and the life world (or sociosphere), which are more or less in line with other social theories (e.g., Habermas, 1981), Huber introduces a third sphere: nature, or the biosphere. The main problems in

the present society are, according to Huber, related to the colonization of both the sociosphere and the biosphere by the industrial system (or technosphere). These problems, interpreted as structural design faults of the industrial system, can be overcome by an ecosocial restructuring of the technosphere, which Huber calls ecological modernization. The industrial, rather than capitalist or bureaucratic, character of modernity is the point of departure for the theory of ecological modernization.

Evaluating Ecological Modernization

In this section, we evaluate the theory of ecological modernization with three different criteria: its view of historical development and the role of technology in it; its definition of environment/nature; and its treatment of the role of the state. We define the theoretical position of ecological modernization in the debate on environment and modernity.

What is the place of ecological modernization among theories on the relationship between modern society and the environment? Adapting Giddens's conceptual scheme of the four dimensions of modernity, ecological modernization can be said to focus primarily on the dimension of industrialism. In analyzing the main characteristics of modern society pertaining to the industrial or technological system, ecological modernization can be said to belong to the branch of society that Badham (1984, 1986) calls the industrial society theory. It highlights the industrial rather than the capitalist character of modern society. Furthermore, the ecological modernization approach stands in direct opposition to counterproductivity theory or demodernization theses in its conviction that the only possible way out of the ecological crisis is by going further into industrialization, toward hyper- or superindustrialization. Ecological modernization must be analyzed in continuity with the present system (Huber, 1985). Finally, the ecological modernization approach diverges from neo-Marxist social theories in paying little attention to changing relations of production or to altering the capitalist mode of production altogether. The focus of ecological modernization is undoubtedly on the development of the industrial system. The ecological restructuring of modern society is limited to changing the organization of production and consumption activities and does not extend to Schnaiberg's (1980) treadmill of production. On the contrary, the capitalist character of modern society is hardly questioned, as capitalist relations of production and a capitalist mode of production are seen as not relevant to overcoming the ecological problem. According to Huber (1985):

Kapitalistisch zu sein, ist nichts Unanständiges, sondern eine Eigenschaft, die uns qua Zeitgenossenschaft zufällt, wobei fraglich ist, wie lange der kapitalismus-Begriff überhaupt noch zeitgemäss sein wird. (pp. 77-78)⁵
[Capitalism is nothing indecent, but a given quality of our age, and it might even be asked how long the concept of capitalism will be in any sense up to date.]

Focusing on technologically induced developments within the industrial system, the theory of ecological modernization exposes an evolutionary and technologically deterministic view of social development that is characteristic of the theories of industrial society. The ecological switchover is analyzed as a logical, necessary, and inevitable next stage in the development of the industrial system—the system correcting itself for the construction fault of neglecting ecology. In the “system evolutionary” view of historical developments, technology and technological innovations are the motor for so-

cioecological change. Technological developments seem to take place autonomously and to determine the changes that take place both within the industrial system itself and those occurring in its relationship with the social and natural environments. This becomes very clear when Huber (1985, 1989b) speaks of the "technosystem" rather than the industrial system, emphasizing the central role of technology in the overall development of society. This kind of technological determinism can be questioned both from the viewpoint of recent studies concerning the social construction of technological developments (Bijker, Hughes, and Pinch, 1987; Hughes, 1986) and from a theoretical perspective that tries to combine actor- and system-oriented approaches in explaining social change.

The ecological modernization approach conceptualizes nature or the environment as one of the two spheres that are threatened by the dynamics of the industrial system, the other being the life world. In concentrating on the use that is made of nature within production, ecological modernization focuses primarily and exclusively on the relationship between the technosystem and nature. In other words, the central concerns of ecological modernization are depletion of natural resources and pollution of the environment in relation to the sustenance base. The relationship between what Huber (1989) calls the *sociosphere* and the deterioration of nature is not discussed. This relationship deals with what we have called "intuited nature."

The differentiation between political and economic spheres of the industrial system seems to have very little relevance within the ecological modernization approach. Both are seen as integral parts of the industrial system and are functional for the development of the industrial system. Huber (1989a) puts it as follows:

Zu sagen, das Wissenschaft und Technik als "Produktivkräfte" zu bestimmenden formativen Faktoren geworden sind, heisst nicht, die Bedeutung von Markt und Staat zu verkennen. Es heisst, sich von der Technik einen umfassenderen Begriff zu machen und Markt und Staat selbst als Teil eines umfassenden technischen Systems zu verstehen, und zwar als institutionelles Gehäuse der technischen Entwicklung, als das Gefüge administrativer und wirtschaftlicher Rahmenbedingungen, die auf die technische Entwicklung einwirken. (pp. 10-11)

[To say that science and technology have changed from "forces of production" to the determining factors forming society does not denote an undervaluation of the significance of market and state. It means making technology an inclusive concept and interpreting the technological system as comprising market and state. It also means interpreting market and state as the institutional context of technological development, as the administrative and economic frameworks that influence technological developments.]

In what is seen as the autonomous development of the industrial system, propelled by technological innovation, the state plays no central role in redirecting the processes of production and consumption. Huber (1989a) even regards state intervention to promote ecological modernization as counterproductive in the long term, because it frustrates the innovation process. Huber uses Hobbes' *Leviathan* as an undesirable and threatening image of growing state intervention. However, there is widespread consensus in the field of environmental policies about the necessity of national and international state intervention. State intervention in the environmental field during the 1970s was primarily organized at the national level and directed toward repairing the shortcomings of free-market competition by internalizing environmental external effects within the market. Over the

last decade, we have witnessed an increasing awareness of the international nature of environmental problems, inter- and supranational policies being developed to coordinate national efforts, and, especially in the context of the European Community (EC), a harmonizing of national economic interests with environmental policies. Nowadays, it seems very hard to imagine an ecological switchover without state intervention at various levels.

Having made a theoretical assessment of the concept of ecological modernization, we can draw some conclusions. The ecological modernization approach clarifies the relation between modern society and its environment with respect to one essential, institutional clustering within modernity. Huber's theory makes it possible to define the environmental crisis in more detail and is more appropriate with regard to one of its central dimensions, the burdening of the sustenance base. In this respect, it makes a contribution to our understanding of the complex relation between environment and modernity similar to that of Schnaiberg (1980). Some of the weaknesses of the ecological modernization theory include:

- paying little attention to the role of state institutions and being overoptimistic about the dynamics of the market;
- using a definition of environment or environmental crisis that is restricted to the dimension we have called the sustenance base or the burdening of the sustenance base, which pays no attention whatsoever to the experienced nature of everyday life;
- being representative of industrial society theories in using a conceptual model to analyze the historical development of industrial society, which can be said to have a technologically deterministic character.

Ecological Modernization: A Political Program

As already noted, ecological modernization is not merely a theoretical framework for analyzing the relationship between the institutional structure of modern industrial society and environmental problems. It is also used as a political program sketching the way out of the environmental crisis. There is, of course, a very close connection between the political program and the theoretical concept.

Three Political Programs

Looking at the main programs of reform suggested within the field of environmental policy, a limited number of political projects can be distinguished. Jänicke (1988), for instance, discusses four different strategies toward environmental problems in modern industrial societies. In the discussion about "preventive environmental policy," other authors make different classifications or mention the same strategies but with different names or definitions. We regard the underlying structure of all these classifications as composed of two distinctive political programs toward the environmental crisis. The first one focuses on compensation for environmental damage and on the use of additional technology to minimize the effects of growing production and consumption on the environment. The second political program, which can be said to be in line with the theory of ecological modernization, focuses on altering processes of production and consumption. Common descriptive notions used in the second program include clean technology, economic valuation of environmental resources, alteration of consumption and production styles, prevention, and monitoring of compounds through the production-

consumption cycles, to name but a few. Among proponents of this political program, there is some discussion about the exact meaning of policies aimed at restructuring production processes, or "umbau," versus policies that are directed toward the selective contraction, or "abbau," of the economy, for instance on the issue of synthetic materials. This, however, is a discussion within the framework of modernity.

In the proposals and measures normally put forward outside the official policy arena, a third program can be distinguished, focused on what Ullrich (1979) calls the progressive dismantling or deindustrialization of the economy and the transformation of today's production structure into small-scale, or smaller-scale than at present, units representing a closer and more direct link between production and consumption. This strategy, well known from the reform program developed in the early 1970s, must be distinguished from the limited, selective abbau programs contained within the second perspective. This third, more embracing policy of environmental/social reform, directed at demodernization rather than modernization, seems to have lost its attraction to a considerable extent.

We argue that, in The Netherlands at least, official environmental policies suggested and already partially implemented by the environmental sectors of the administration are moving from the first to the second program. At the same time, a switch from the third perspective to the second can be noticed within major sections of the environmental movement, with regard to both ideology and strategy. A broad consensus gradually seems to have come about, at least within Dutch society, as regards the general approach best suited to overcome the environmental crisis. Ecological modernization seems to be the general concept that describes this growing consensus.

The General Direction of Dutch Environmental Policy

Developments in Dutch environmental policy concerning relations between the state and environmental polluters (often called target groups by state officials) can be divided into three phases. The initial phase, in the 1970s, can be characterized as a top-down state environmental policy, with big conflicts about individual measures, broad strategies, and final goals between the Department of the Environment, target groups (and their affiliates within the state bureaucracy), and the environmental movement. It was a sectoral and end-of-pipe-oriented policy. This situation changed from the beginning of the 1980s. The deregulation debate after the economic crisis, the crisis of the welfare state, the poor results of environmental policy, and the depolitization of environmental issues led to discussions and initiatives to provide target groups with greater influence on and responsibilities toward environmental policy. This transitional second stage switched to the third stage by the end of the 1980s, as symbolized by the launching of the first National Environmental Policy Plan in 1989 (Ministry of Environment, 1989). Dutch environmental policy changed during this third phase, at least on paper, from an end-of-pipe strategy toward an ecological modernization perspective. The old strategy of repairing environmental deterioration after the fact and regulating environmental problems by introducing additional technology, leaving the general structure of production and consumption processes untouched, has been abandoned. The core of the new approach, which must lay the basis for sustainable development, is:

closing substance cycles—the chain from raw material via production process to product, waste, and recycling must contain as few leaks as possible;

conserving energy and improving the efficiency and utilization of renewable energy sources;
improving the quality of production processes and products.

The central issue in environmental policy is the restructuring of production-consumption cycles, to be accomplished through the use of new, sophisticated, clean technologies. The private sector and the target groups (agriculture, industry, consumers, etc.), play a central role in achieving this objective. Target groups have to take responsibility for ecologizing production and consumption by innovating production technologies and products and by changing patterns of behavior. Environmental management systems and environmental audits in industry and agriculture are central instruments for attaining the structural incorporation of environmental issues in the behavior of private-sector enterprises. These environmental management systems should take into consideration all environmental issues of plant operation and products by monitoring the relevant flows of compounds and energy to minimize their effects on the environment.

The government plans to use more financial incentives to induce producers and consumers to assume their responsibilities toward the environment and to incorporate environmental costs in economic decision making. The use of fiscal measures, environmental taxes, deposits on products and materials, and economic incentives in general have been proposed and, to a limited extent, introduced until now.

Although there is considerable debate between different state departments, and between the Ministry of the Environment and some target groups, on concrete measures and the speed of realizing environmental policy goals, there seems to be a general consensus on the main approach, direction, and goals of environmental policy. When certain economic parameters are taken into consideration, proposals for restructuring production-consumption cycles do not meet with much opposition.

Dutch Environmental Movement

An ideological change has taken place in the Dutch environmental movement since 1980 (Cramer, 1988). Large sections of this social movement were highly critical of capitalist economic growth, the ongoing process of industrialization, and technological development before the 1980s. The climax of protest against nuclear power at the beginning of the 1980s can be seen as a turning point, both in the struggle against the dominant institutions of modern society and with regard to what Tellegen (1983) calls the antimodernity ideology of the environmental movement. The main reasons for this switch in ideology and strategy were expanding socioeconomic stagnation and crisis, the changing political climate toward realism, growing acceptance of the environmental movement as a political factor by state institutions, and concrete successes of more modest environmental strategies and ideologies.

The Dutch environmental movement is, for the most part, no longer strategically or ideologically opposing large-scale industrial production and technological innovations, as long as these are environmentally sound. A radical farewell has been said to the small is beautiful ideology, and technological developments are seen as potentially very useful in regulating environmental problems (Mol and Spaargaren, 1991). At the same time, apart from neo-Marxist analyses, the focus is not so much against capitalism or economic growth, but rather against concrete, environmentally harmful economic developments. Capitalist relations of production, operating as a treadmill in the ongoing process

of economic growth, are rarely emphasized. The environmental movement has adopted an ecological modernization approach, highlighting the necessity for adaptation of the modernization process to ecological limits. Within this paradigm, a limited and selective contraction or constriction of economic growth is seen as unavoidable by environmentalists (e.g., Cramer, 1988; Nijkamp and Reijnders, 1989; Schöne, 1987; Vereniging Milieudefensie, 1991).

A pragmatic and less oppositional environmental movement was established during the 1980s. Its aims were neither changing the capitalist relations of production or the treadmill of production, nor working toward a deindustrialization or demodernization of the economy. Today, the main strategy and goals seem to be the ecologizing of processes of production and consumption within modernity. A switch has taken place from the third perspective to ecological modernization.

Conclusion

In this paper, we have tried to give a selective review of the theoretical contributions relevant to environmental sociology, when this subdiscipline deals with the relationship between environment and institutional developments in modern society.

Three schools of thought were identified as relevant to the sociological contribution to the environmental debate. One tradition works from a Marxist perspective and deals with the treadmill of production as the main cause of disturbances in the sustenance base; another school highlights the industrial dimension of modernity in analyzing environmental deterioration; and a third emphasizes the counterproductivity of the development of modern society. We conclude that there is a lack of sophisticated theories dealing explicitly with the relationship between institutional developments of modern society—whether it be capitalism, industrialism, or another development—and the burdening of the sustenance base in all three schools of thought. In that sense, environmental sociology is still in its infancy.

One of the recent sociological theories dealing explicitly with the relationship between modernity and environment has given some attention to these issues: ecological modernization. The popularity of this theoretical concept is based on its close correspondence with the idea of sustainable development, combined with recent changes in environmental policy and dominant ideologies of the environmental movement in some Western European countries.

The theory of ecological modernization is limited insofar as it deals with only the industrial dimension of modernity, neglecting dimensions of capitalism and surveillance, and because it narrows the concept of nature to the sustenance base. On this last issue, ecological modernization is consonant with most of the other relevant contributions to the debate on environment and modernity, which also ignore, to a large extent, intuited nature. We think the distinction between the two dimensions of nature, intuited nature and scientific nature, might fruitfully be further theorized. We only indicate the general direction of analysis here. In the first place, elaborating on intuited nature would necessitate an emphasis within environmental sociology on themes that, to a certain extent, have been left in the hands of philosophers and social psychologists up to now, specifically, the ways human actors deal with nature, its integrity, its intrinsic value, and its value for human agents. In the second place, and in our opinion essential for environmental sociology in the near future, it would mean giving high priority to the analysis of the risk profile (Beck, 1986; Dietz and Frey, 1992; Giddens, 1991) of modern society

and the way people handle this dimension of the environmental crisis within their everyday lives.

Notes

1. We are aware that a significant group of sociologists, as well as biologists, has tried to work out a historical, nondeterministic form of evolutionary theory, giving human agency pride of place. See, for example, Musil (1990) and Dietz and Burns (1992).
2. Reprinted from A. Giddens, 1985, *The Nation-State and Violence*, Cambridge, UK: Polity Press. Used with permission.
3. Reprinted from A. Giddens, 1990, *The Consequences of Modernity*, Cambridge, UK: Polity Press. Used with permission.
4. Of course one cannot just leave matters here. A proper treatment of the role of the state in environmental planning is hardly possible without entering into the complex debate on state regulation in a period that Lash and Urry designated as the end of organized capitalism (Lash and Urry, 1987). We provide a more extended discussion in Spaargaren and Mol (1991).
5. Reprinted from Joseph Huber, 1985, *Die Regenbogengesellschaft, Ökologie und Sozialpolitik (The Rainbow Society, Ecology and Social Policy)*, copyright © 1985 S. Fischer Verlag GmbH, Frankfurt am Main. Used with permission.

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